

What is claimed is:

1. An apparatus for filling a chamber, the apparatus comprising:
5 a hopper adapted to contain a powder pharmaceutical formulation, the hopper comprising an outlet; and

a disturbance member capable of disturbing a medium within the hopper, the disturbance of the medium being sufficient to control the flow of powder through the outlet,
10 whereby the chamber may be filled by powder flowing through the outlet and into the chamber.

2. An apparatus according to claim 1 wherein the medium comprises a gas.

3. An apparatus according to claim 1 wherein the medium comprises air.

15 4. An apparatus according to claim 1 wherein the disturbance member is a vibratable member capable of generating vibrations within the hopper.

20 5. An apparatus according to claim 4 wherein the vibratable member comprises a membrane.

6. An apparatus according to claim 5 wherein the membrane is adapted to vibrate at a frequency selected to fluidize the powder.

25 7. An apparatus according to claim 5 wherein the membrane is adapted to vibrate at a frequency selected to cause resonance within the container.

8. An apparatus according to claim 1 wherein the vibratable member is adapted to vibrate at a frequency of from about 10 Hz to about 1000 Hz.

30 9. An apparatus according to claim 1 further comprising a powder vibrating member.

10. An apparatus according to claim 9 wherein the powder vibrating member comprises a member adapted to vibrate in contact with the powder.

5 11. An apparatus according to claim 9 wherein the powder vibrating member has a longitudinal axis and wherein the powder vibrating member vibrates in a direction parallel to the longitudinal axis.

10 12. An apparatus according to claim 1 wherein the chamber is a chamber in a receptacle.

13. An apparatus according to claim 12 wherein the receptacle is a blister pack.

14. An apparatus according to claim 12 wherein the receptacle is a capsule.

15 15. An apparatus according to claim 1 further comprising the chamber and wherein the chamber is adapted to transport the powder to a receptacle.

20 16. An apparatus according to claim 15 wherein the chamber is a metering chamber.

17. An apparatus according to claim 15 wherein the chamber is in a rotatable member.

25 18. An apparatus according to claim 17 wherein the rotatable member is rotatable between a powder receiving position and a powder ejecting position.

19. An apparatus according to claim 1 wherein the hopper comprises an enclosure having side walls.

30 20. An apparatus according to claim 19 wherein the hopper comprises a cover and

wherein the vibratable member comprises a membrane in proximity to the cover.

21. An apparatus according to claim 19 wherein the hopper comprises a cover and wherein the cover comprises the vibratable member.

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22. An apparatus for filling a chamber, the apparatus comprising:
a hopper adapted to contain a powder pharmaceutical formulation, the hopper comprising an outlet; and

10 a vibratable member positioned in, on, or near the hopper so that the vibratable member is spaced from powder in the hopper, the vibratable member being capable of fluidizing the powder in the hopper,

whereby the chamber may be filled with powder flowing through the outlet and into the chamber.

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23. An apparatus according to claim 22 wherein the vibratable member comprises a membrane.

24. An apparatus according to claim 23 wherein the membrane is adapted to vibrate at a frequency selected to fluidize the powder.

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25. An apparatus according to claim 22 further comprising a second vibratable member.

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26. An apparatus according to claim 25 wherein the second vibratable member comprises a member adapted to contact the powder.

27. An apparatus according to claim 25 wherein the second vibratable member has a longitudinal axis and wherein the second vibratable member vibrates in a direction parallel to the longitudinal axis.

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28. An apparatus according to claim 22 wherein the chamber comprises a

receptacle.

29. An apparatus according to claim 22 further comprising the chamber and wherein the chamber is adapted to transport the powder to a receptacle.

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30. An apparatus according to claim 29 wherein the chamber is a metering chamber.

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31. A method of filling a chamber, the method comprising:
providing a powder pharmaceutical formulation in a hopper;
disturbing a medium in the hopper to fluidize the powder; and
passing the powder through an outlet and into the chamber.

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32. A method according to claim 31 wherein the medium comprises a gas.

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33. A method according to claim 31 wherein the medium comprises air.

34. A method according to claim 31 comprising disturbing the medium by generating vibrations within the medium.

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35. A method according to claim 34 wherein the vibrations are generated by vibrating a membrane.

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36. A method according to claim 35 wherein the membrane is adapted to vibrate at a frequency selected to fluidize the powder so that the powder will pass through the outlet.

37. A method according to claim 36 wherein the membrane is vibrated at a frequency of from about 10 Hz to about 1000 Hz.

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38. A method according to claim 31 further comprising vibrating a member that is in contact with the powder.

39. A method according to claim 31 wherein the chamber comprises a receptacle and further comprising sealing the receptacle.

5 40. A method according to claim 31 further comprising transferring the powder from the chamber to a receptacle.

10 41. A method according to claim 31 comprising rotating the chamber from a powder receiving position to a powder ejecting position.

15 42. A method of filling a chamber, the method comprising:
providing a powder pharmaceutical formulation;
vibrating a member spaced from the powder to fluidize the powder; and
passing the powder through an outlet and into the chamber.

43. A method according to claim 42 wherein the member is a membrane.

44. A method according to claim 43 wherein the membrane is adapted to vibrate at a frequency selected to fluidize the powder so that the powder will pass through the outlet.

20 45. A method according to claim 42 wherein the powder is vibrated at a frequency of from about 10 Hz to about 1000 Hz.

25 46. A method according to claim 42 further comprising vibrating a second member, the second member being in contact with the powder.

30 47. A pharmaceutical package made by a process comprising:
providing a receptacle;
filling the receptacle with a powder pharmaceutical formulation that has been fluidized by a fluidization member spaced from the powder; and
sealing the receptacle to secure the powder pharmaceutical formulation

therein.

48. A pharmaceutical package according to claim 47 wherein the receptacle comprises a blister package.

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49. A pharmaceutical package according to claim 48 wherein the blister package comprises a lower layer comprising a cavity.

10 50. A pharmaceutical package according to claim 49 wherein the blister package comprises an upper layer that is sealable onto the lower layer.

51. A pharmaceutical package according to claim 50 wherein at least one of the layers comprises a metal.

15 52. A pharmaceutical package according to claim 50 wherein both layers comprise a metal.

53. A pharmaceutical package according to claim 47 wherein the receptacle is at least a portion of a capsule.

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54. A pharmaceutical package according to claim 47 wherein the receptacle is at least a portion of vial.

25 55. A pharmaceutical package according to claim 47 wherein the receptacle is a bottle.

56. A pharmaceutical package according to claim 47 wherein the package is made by a process further comprising metering the powder in a metering chamber before filling the receptacle.

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57. A pharmaceutical package according to claim 56 wherein the package is made

by a process further comprising rotating the metering chamber.

58. A pharmaceutical package according to claim 47 wherein the package is made by a process wherein the pharmaceutical formulation is also fluidized by a vibrating member in contact with the powder.